



SAFETY DATA SHEET

Issue Date 28-May-2015

Revision Date 10-Apr-2019

Version 4

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Name Hafnium Powder and Fines

Other means of identification

Product Code SAC023
UN/ID No. 3089
Synonyms Hafnium metal, dry. (Product #403)

Recommended use of the chemical and restrictions on use

Recommended Use Alloy product manufacture.
Uses advised against

Details of the supplier of the safety data sheet

Manufacturer Address

ATI, 1000 Six PPG Place, Pittsburgh, PA
15222 USA

Emergency telephone number

Emergency Telephone Chemtrec: 1-800-424-9300

2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids

Category 1

Label elements

Emergency Overview

Danger

Hazard statements

Flammable solids



Appearance Powder

Physical state Solid

Odor Odorless

Precautionary Statements - Prevention

Wear protective gloves/protective clothing/eye protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
If dust clouds can occur, use explosion-proof electrical/ ventilating/lighting/equipment

Precautionary Statements - Response

In case of fire: Use salt (NaCl) or class D dry powder for extinction

Hazards not otherwise classified (HNOC)

Not applicable

Other Information

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms Hafnium metal, dry. (Product #403).

| Chemical Name | CAS No. | Weight-% |
|---------------|-----------|----------|
| Hafnium | 7440-58-6 | 97- >99 |
| Zirconium | 7440-67-7 | 0-3 |

4. FIRST AID MEASURES

First aid measures

Eye contact In the case of particles coming in contact with eyes during processing, treat as with any foreign object.

Skin Contact None under normal use conditions.

Inhalation If excessive amounts of smoke, fume, or particulate are inhaled during processing, remove to fresh air and consult a qualified health professional.

Ingestion IF SWALLOWED. Call a POISON CENTER or doctor/physician if you feel unwell.

Most important symptoms and effects, both acute and delayed

Symptoms None anticipated.

Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Isolate large fires and allow to burn out. Smother small fires with salt (NaCl) or class D dry powder fire extinguisher.

Unsuitable extinguishing media Do not spray water on burning metal as an explosion may occur. This explosive characteristic is caused by the hydrogen and steam generated by the reaction of water with the burning material.

Specific hazards arising from the chemical

Intense heat. Very fine, high surface area material resulting from processing this product may ignite spontaneously at room temperature. WARNING: Fine particles of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimize combustible dust hazard.

Hazardous combustion products Not applicable.

Explosion data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge May be ignited by heat, sparks or flames.

Protective equipment and precautions for firefighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Use personal protective equipment as required.

For emergency responders Use personal protective equipment as required. Follow Emergency Response Guidebook, Guide No. 170.

Environmental precautions

Environmental precautions Collect spillage to prevent release to the environment.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Sweep or shovel material into dry containers using non-sparking tools. Avoid creating uncontrolled dust.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Intense heat. Very fine, high surface area material resulting from grinding, buffing, polishing, or similar processes of this product may ignite spontaneously at room temperature. **WARNING:** Fine particles of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimize combustible dust hazard.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). For long-term storage, keep sealed in argon-filled steel drums.

Incompatible materials Dissolves in hydrofluoric acid. Ignites in the presence of fluorine. When heated above 200°C, reacts exothermically with the following. Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters**Exposure Guidelines**

| Chemical Name | ACGIH TLV | OSHA PEL |
|------------------------|--|--|
| Hafnium 7440-58-6 | TWA: 0.5 mg/m ³ TWA: 0.5 mg/m ³ Hf | TWA: 0.5 mg/m ³ |
| Zirconium 7440-67-7 | STEL: 10 mg/m ³ STEL: 10 mg/m ³ Zr TWA: 5 mg/m ³ TWA: 5 mg/m ³ Zr | TWA: 5 mg/m ³ Zr (vacated) STEL: 10 mg/m ³ (vacated) STEL: 10 mg/m ³ Zr |

Appropriate engineering controls

Engineering Controls Avoid generation of uncontrolled particles.

Individual protection measures, such as personal protective equipment

Eye/face protection When airborne particles may be present, appropriate eye protection is recommended. For

example, tight-fitting goggles, foam-lined safety glasses or other protective equipment that shield the eyes from particles.

Skin and body protection Fire/flamm resistant/retardant clothing may be appropriate during hot work with the product.

Respiratory protection When particulates/fumes/gases are generated and if exposure limits are exceeded or irritation is experienced, proper approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

| | | | |
|--------------------------------------|-------------------------|--------------------------------|----------------|
| Physical state | Solid | Odor | Odorless |
| Appearance | Powder | Odor threshold | Not applicable |
| Color | metallic gray or silver | | |
| <u>Property</u> | <u>Values</u> | <u>Remarks • Method</u> | |
| pH | - | Not applicable | |
| Melting point/freezing point | 2227 °C / 4050 °F | | |
| Boiling point / boiling range | - | | |
| Flash point | - | | |
| Evaporation rate | - | Not applicable | |
| Flammability (solid, gas) | - | Flammable | |
| Flammability Limit in Air | | | |
| Upper flammability limit: | - | | |
| Lower flammability limit: | - | | |
| Vapor pressure | - | Not applicable | |
| Vapor density | - | Not applicable | |
| Specific Gravity | 13.3 | | |
| Water solubility | Insoluble | | |
| Solubility in other solvents | - | | |
| Partition coefficient | - | Not applicable | |
| Autoignition temperature | - | Not applicable | |
| Decomposition temperature | - | Not applicable | |
| Kinematic viscosity | - | Not applicable | |
| Dynamic viscosity | - | Not applicable | |
| Explosive properties | Not applicable | | |
| Oxidizing properties | Not applicable | | |

Other Information

| | |
|-------------------------|----------------------------|
| Softening point | - |
| Molecular weight | - |
| VOC Content (%) | Not applicable |
| Density | - |
| Bulk density | 220-380 lb/ft ³ |

10. STABILITY AND REACTIVITY

Reactivity

Not applicable

Chemical stability

Stable under normal conditions.

Possibility of Hazardous Reactions

None under normal processing.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid

Dust formation and dust accumulation.

Incompatible materials

Dissolves in hydrofluoric acid. Ignites in the presence of fluorine. When heated above 200°C, reacts exothermically with the following. Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

Hazardous Decomposition Products

Not applicable.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation Product not classified.
Eye contact Product not classified.
Skin Contact Product not classified.
Ingestion Product not classified.

| Chemical Name | Oral LD50 | Dermal LD50 | Inhalation LC50 |
|------------------------|-----------------|-------------|-----------------|
| Hafnium 7440-58-6 | > 5000 mg/kg bw | - | >4.3mg/L |
| Zirconium 7440-67-7 | 5000 mg/kg bw | - | >4.3 mg/L |

Information on toxicological effects

Symptoms None known.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Acute toxicity Product not classified.
Skin corrosion/irritation Product not classified.
Serious eye damage/eye irritation Product not classified.
Sensitization Product not classified.
Germ cell mutagenicity Product not classified.
Carcinogenicity Product not classified.

Reproductive toxicity Product not classified.
STOT - single exposure Product not classified.
STOT - repeated exposure Product not classified.
Aspiration hazard Product not classified.

12. ECOLOGICAL INFORMATION

Ecotoxicity

This product as shipped is not classified for aquatic toxicity.

| Chemical Name | Algae/aquatic plants | Fish | Toxicity to microorganisms | Crustacea |
|---------------|--------------------------|--------------------------|----------------------------|--------------------------|
| Hafnium | The 72 h EC50 of hafnium | The 96 h LC50 of Hafnium | - | The 48 h EC50 of Hafnium |

| | | | | |
|------------------------|--|--|---|--|
| 7440-58-6 | to Pseudokirchneriella subcapitata was greater than 8 ug of Hf/L (100% saturated solution). | dioxide in water to Danio rerio was greater than the solubility limit of 0.007 mg Hf/L . | | dioxide to Daphnia magna was greater than the solubility limit of 0.007 mg Hf/L. |
| Zirconium 7440-67-7 | The 14 d NOEC of zirconium dichloride oxide to Chlorella vulgaris was greater than 102.5 mg of Zr/L. | The 96 h LL50 of zirconium to Danio rerio was greater than 74.03 mg/L. | - | The 48 h EC50 of zirconium dioxide to Daphnia magna was greater than 74.03 mg of Zr/L. |

Persistence and degradability

.

Bioaccumulation

.

Other adverse effects**13. DISPOSAL CONSIDERATIONS****Waste treatment methods**

Disposal of wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging Disposal should be in accordance with applicable regional, national and local laws and regulations.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

14. TRANSPORT INFORMATION

| | |
|--|---|
| DOT | Regulated |
| UN/ID No. | 3089 |
| Proper shipping name | Metal powder, flammable, n.o.s. (Hafnium) |
| Hazard Class | 4.1 |
| Packing Group | II |
| Special Provisions | IB8, IP2, IP4, T3, TP33 |
| Emergency Response Guide Number | 170 |

15. REGULATORY INFORMATION**International Inventories**

| | |
|----------------------|------------|
| TSCA | Complies |
| DSL/NDSL | Complies |
| EINECS/ELINCS | Complies |
| ENCS | Complies |
| IECSC | Complies |
| KECL | Complies |
| PICCS | Complies |
| AICS | Not Listed |

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

ENCS - Japan Existing and New Chemical Substances

IECSC - China Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

| | |
|-----------------------------------|-----|
| Acute health hazard | No |
| Chronic Health Hazard | No |
| Fire hazard | Yes |
| Sudden release of pressure hazard | No |
| Reactive Hazard | No |

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

| Chemical Name | New Jersey | Massachusetts | Pennsylvania |
|------------------------|------------|---------------|--------------|
| Hafnium 7440-58-6 | X | X | X |
| Zirconium 7440-67-7 | X | X | X |

U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION

| | | | | |
|-------------|-----------------------------------|----------------------------------|--------------------|------------------------------------|
| <u>NFPA</u> | Health hazards 0 | Flammability 1 | Instability 0 | Physical and Chemical Properties - |
| <u>HMIS</u> | Health hazards 1* | Flammability 2 | Physical hazards 0 | Personal protection X |
| | <i>Chronic Hazard Star Legend</i> | <i>* = Chronic Health Hazard</i> | | |

Issue Date 28-May-2015

Revision Date 10-Apr-2019

Revision Note

Updated Section(s): 2, 5, 6, 7, 9, 11, 14, 15

Note:

The information provided in this safety data sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

**Additional information available
from:**

Safety data sheets and labels available at ATImetals.com